Soil Mechanics

Rate effects, viscosity and creep behaviour in clay

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Rate effects, viscosity and creep behaviour in clay

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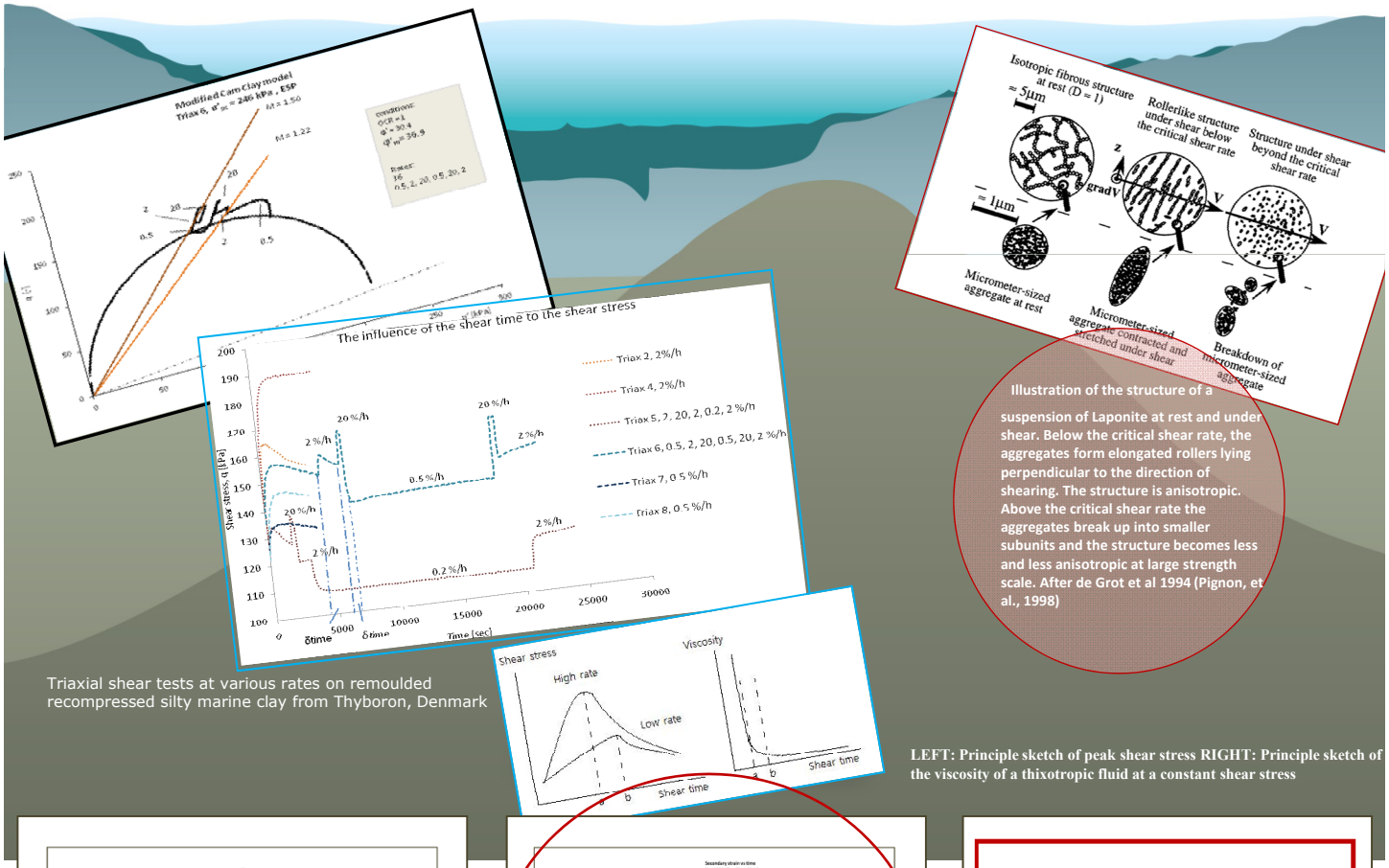
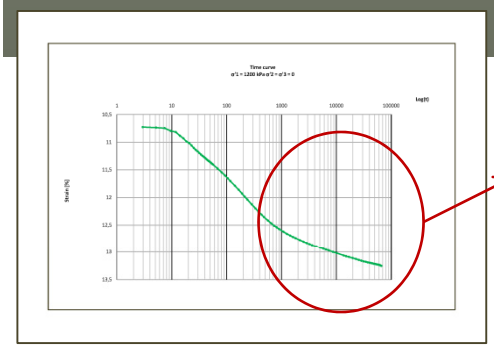
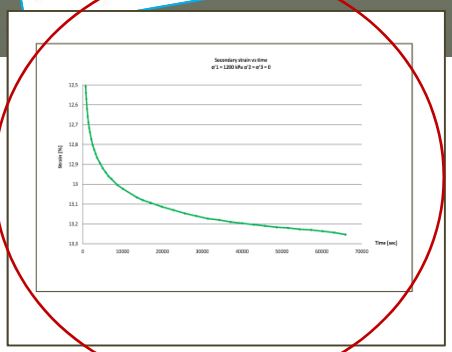


Triaxial shear tests at various rates on remoulded recompressed silty marine clay from Thyboron, Denmark

Illustration of the structure of a suspension of Laponite at rest and under shear. Below the critical shear rate, the aggregates form elongated rollers lying perpendicular to the direction of shearing. The structure is anisotropic. Above the critical shear rate the aggregates break up into smaller subunits and the structure becomes less and less anisotropic at large strength scale. After de Grot et al 1994 (Pignon, et al., 1998)

LEFT: Principle sketch of peak shear stress RIGHT: Principle sketch of the viscosity of a thixotropic fluid at a constant shear stress





$$\tau_{xy} = G \cdot \gamma_{xy}$$

$$\tau_{yx} = -\eta \left| \frac{dv_x}{dy} \right| \Leftrightarrow \tau = -\eta \cdot \dot{\gamma}$$

$$\tau_{zz} - \tau_{xx} - {}^{-}\bar{\eta}_{1(\dot{\varepsilon},\dot{b})} \cdot \dot{\varepsilon}$$